METHODS AND SYSTEMS FOR MULTIROBOTIC MANAGEMENT

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] The present application is a continuation of U.S. patent application Ser. No. 14/679,457, filed on Apr. 6, 2015, which is a continuation of U.S. patent application Ser. No. 13/466,030, filed on May 7, 2012, which claims priority to U.S. Patent Application No. 61/483,295, filed on May 6, 2011, and to U.S. Patent Application No. 61/593,078, filed on Jan. 31, 2012, all of which are herein incorporated by reference.

BACKGROUND

[0002] Cloud computing refers to provision of computational resources via a computer network. In a traditional model of computing, both data and software are fully contained on a user's computer. In cloud computing, however, the user's computer may contain relatively little software or data (perhaps a minimal operating system and web browser, for example), and may serve as a display terminal for processes occurring on a network of computers. A common shorthand provided for a cloud computing service or system (or even an aggregation of existing cloud services) is "the cloud."

[0003] Cloud computing has been referred to as "client-server computing", however, there may be distinctions between general cloud computing and client-server computing. For example, client-server computing may include a distributed application structure that partitions tasks or workloads between providers of a resource or service (e.g., servers), and service requesters (e.g., clients). Client-server computing generally involves a one-to-one relationship between the server and the client, whereas cloud computing includes generic services that can be accessed by generic clients (e.g., a one-to-one relationship or connection may not be required). Thus, cloud computing generally includes client-server computing, and additional services and functionality.

BRIEF SUMMARY

[0004] In one aspect of this disclosure, a first example method is provided. The first example method involves receiving, by a leader robot, first sensory data captured by a first follower robot and second sensory data captured by a second follower robot. The first follower robot has a first sensing capability and the second follower robot has a second sensing capability that is different than the first sensing capability. The leader robot is configured to communicate with the first follower robot and the second follower robot and to direct action of one or more of the first follower robot and the second follower robot. The first example method further involves determining a command function based on at least one of the first sensory data and the second sensory data. The first example method still further involves communicating with at least one of the first follower robot and the second follower robot based on the command function.

[0005] In another aspect of this disclosure, a second example method is provided. The second example method involves receiving, by a command robot, data captured by one or more client robots in a plurality of client robots. The command robot is configured to communicate with each of the plurality of client robots and to direct action of one or more of the plurality of client robots. Each client robot in the plurality of client robots has a respective data capture capability and is configured to communicate with the command robot through a cloud computing system. The second example method further involves determining a command function based on the data captured by the one or more client robots. The second example method still further involves communicating with at least one client robot in the plurality of client robots based on the command function.

[0006] In still another aspect of this disclosure, an example system is provided. The example system includes a command robot and a plurality of client robots. The command robot is configured to communicate with each of the plurality of client robots and to direct action of one or more of the plurality of client robots. Each client robot includes at least one sensor, a client-robot processor, a client-robot memory, and client-robot program instructions stored in the client-robot memory and executable by the client-robot processor to perform client-robot operations, involving capturing data from the at least one sensor, capturing data from an electronic device, and communicating with the command robot through a cloud computing system. The command robot includes a command-robot processor, a command-robot memory, and command-robot program instructions stored in the command-robot memory and executable by the command-robot processor to perform command-robot operations, involving communicating with each client robot through the cloud computing system, analyzing data captured by each client robot, determining a command function based on the analyzed data, and communicating with one or more of the client robots based on the command function.

[0007] In yet aspect of this disclosure, an example article of manufacture is provided. The example article of manufacture includes a computer-readable storage medium, having stored thereon program instructions that, upon execution by a computing device, cause the computing device to perform operations. The operations include: (a) receiving first sensory data captured by a first robot and second sensory data captured by a second robot, in which the first robot has a first sensing capability and the second robot has a second sensing capability that is different than the first sensing capability; (b) determining a command function based on at least one of the first sensory data and the second sensory data; and (c) communicating with at least one of the first robot and the second robot based on the command function.

[0008] The foregoing summary is illustrative only and is not intended to be in any way limiting. In addition to the illustrative aspects, embodiments, and features described above, further aspects, embodiments, and features will become apparent by reference to the Figures and the following Detailed Description.

BRIEF DESCRIPTION OF THE FIGURES

[0009] FIG. **1** is an example system for cloud-based computing;

[0010] FIG. **2**A illustrates an example client device;

[0011] FIG. **2**B illustrates a graphical example of a robot;

[0012] FIG. **2**C illustrates another example of a robot;

[0013] FIG. **3** illustrates an example of a conceptual robot-cloud interaction;